

## ABSTRACT

Techniques for fabricating well-controlled, random relief, engineered surfaces that serve as substrates for EUV optical devices are accomplished with grayscale exposure. The method of fabricating a multilevel EUV optical element includes: (a) providing a substrate; (b) depositing a layer of curable material on a surface of the substrate; (c) creating a relief profile in a layer of cured material from the layer of curable material wherein the relief profile comprises multiple levels of cured material that has a defined contour; and (d) depositing a multilayer reflection film over the relief profile wherein the film has an outer contour that substantially matches that of the relief profile. The curable material can comprise photoresist or a low dielectric constant material.